OSTEOMYELITIS: Four Unusual Cases and an Assessment of the Modern Management of the Disease

By **H. R. ORMONDE, M.B., B.Ch., B.A.O.**

Waveney Hospital, Ballymena, Co. Antrim

THE clinical features of osteomyelitis have changed in recent years and diagnosis is now more difficult. In this paper four cases of osteomyelitis will be described. No case was typical of the textbook picture and none was diagnosed on admission: indeed, the difficulty in diagnosis was a feature of each case and the differential diagnoses are interesting. Two of the cases had an acute onset. Two had an insidious onset and they had had antibiotic treatment before admission. This added considerably to the difficulty in diagnosis, and also illustrates very clearly one of the common dangers in the treatment of this disease, namely, the inadequate dosage in which antibiotics are often given. They are often given in insufficient dosage in many disease processes, especially chest infections, but in perhaps no other pathological process does the patient pay so big a price for this in terms of immobility as he does in acute hæmatogenous osteomyelitis. It is an embarrassing indictment that in these days of superlative antibiotics some practitioners increase their patients' misery by not using them properly.

Case 1. The patient was a girl aged 6 who complained of pain in the left groin three days before admission. It was fleeting in nature and the day before admission she was walking around without difficulty. Next day she was toxic and anorexic and complaining of severe abdominal pain. She had no treatment before admission.

Examination on admission revealed a temperature of 104.6° F. and a pulse rate of 130, and she was delirious. Her ears, throat, and chest were normal and there were no abnormal neurological findings. She was tender in the left side of her abdomen and rectal examination was normal. Her hip joints moved normally and there was no bony tenderness anywhere. It was thought that she might have some intra-pelvic inflammation or a C.N.S. lesion. Immediate investigations included a lumbar puncture, a full blood picture, a Paul-Bunnell, C.S.U. analysis and X-rays of pelvis and lower limbs. All were negative or normal except the blood picture which showed a white cell count of 10,000 and an E.S.R. of 94 mm. in one hour.

Still undiagnosed, she was put on intravenous fluids containing achromycin and was fever nursed. Next day her abdominal signs had increased and a laparotomy was carried out, but no intra-abdominal lesion was discovered and the abdomen was closed.

She deteriorated over the next forty-eight hours, her temperature reaching 106° F. at one time, when it was thought she was going to die. However, she rallied and began to improve and her convalescence was uninterrupted until her discharge twelve weeks later. The E.S.R. was repeated twice weekly and this

showed a slow but sure improvement. X-rays were repeated at the end of the first, second, and third weeks, and it was not till then that minimal osteoporosis was noted at the upper end of the left femur. Further pictures at fortnightly intervals revealed further reaction of osteomyelitis but by now her general condition was good. At the end of twelve weeks the child was well, but there was structural weakness in the bone.

Case 2. The patient was a 23-year-old male who was referred to the Surgical Out-patients by his own doctor because of pain in the anterior surface of the upper third of the left tibia which had been present for three weeks. There was no history of injury and he had no pain when walking around, although there was some stiffness at night, and he had never been off work. His own doctor had given him a ten-day course of intramuscular penicillin without much improvement.

On examination the temperature was 99 and was never more than this during the whole course of the disease.

The E.S.R. was 52 mm. in one hour and an X-ray showed a periosteal reaction involving the upper third of the tibial shaft with medullary cavitation, the picture being consistent with that of osteogenic sarcoma, thus confirming the clinical impression.

He was admitted forthwith for biopsy of the periosteum and the growth. The biopsy report stated categorically that this was not an osteogenic sarcoma but a non-specific periostitis, adding the rider that if there was any suggestion of a tumour in relation to the cavity further biopsies must be undertaken.

This was done a week later and this time copious amounts of pus were found in the medullary cavity, the organism being a penicillin sensitive staphylococcus. The second biopsy again showed non-specific inflammation and the patient was put on full antibiotic coverage. Check X-rays showed an increase in the size of the cavity with sequestrum formation and a month after the second biopsy sequestrectomy was undertaken and the bone packed. The wound was well healed in four months and the patient made a full recovery.

Case 3. This patient, a boy aged 15, was admitted with a brawny swelling over the left clavicle after lifting bags of potatoes two days before. He had no treatment before admission.

On admission he was febrile with a temperature of 105 and an E.S.R. of 34 mm. in one hour. There was a painful non-localised œdema of the whole of the left shoulder region. X-rays were negative. He was put on antibiotics and in five days he developed a well-marked tonsillitis. Two days after this chest X-rays revealed consolidation in the left lung with a basal effusion. Fifteen millimetres of turbid fluid were aspirated. He was quite ill during this time and two days later the cellulitis in the shoulder region increased and an incision was made into it releasing some serous fluid which cultured staphylococcus pyogenes. Three weeks later he had improved considerably but the E.S.R. was now 70 mm. in one hour. There was still no evidence of a bone lesion but a small basal effusion was present. By the end of six weeks the effusion had resolved and he had developed X-ray changes of osteomyelitis of the whole length of the clavicle with a pathological

fracture. At operation there was little or no pus and no sequestration. The bone was opened, curetted, and packed, and gradually healed after eight months.

Case 4. This patient was aged 26 and was seven months pregnant with her second child on admission. She had had a sore throat some two months previously and influenza a fortnight later and she had been treated by her own doctor with antibiotics. She had vomited three times in the week before admission and now had vague pains in both legs.

On admission her temperature was 99° F., but it fell to normal next day and remained so for three weeks. Full clinical examination revealed no abnormality except for a faint systolic murmur and her uterus corresponded to her dates. Investigations were started at once. Throat swabs and blood cultures were negative. A C.S.U. was normal. Electrophoretic patterns were normal, but a white cell count was 14,000 and her E.S.R. was 68 mm. in one hour.

She was put on aspirin (5 gr. t.d.s.) and she continued vaguely with her complaints. Her E.S.R. rose to 112 and 130 mm. in one hour in consecutive weeks. At the end of a month she developed a swelling in her right thigh and X-rays were taken of both femora. These showed extensive new bone formation around the middle third of the shaft of the right femur with similar changes at a slightly lower level in the left, the appearances being consistent with osteomyelitis. This was an interesting finding, as multiple bone involvement in osteomyelitis is rare. Next day the right thigh was explored and the femur drilled. Large quantities of thick pus were found and swabs were taken and the wound packed. Tetracycline therapy was started at once. A 4 lb. baby was born the next day after a 2½-hour labour. The child was discharged in four weeks, the mother in four months, and after eight months the mother had no disability.

Incidence.

Most authors over the past decade report a gradual increase in the incidence of osteomyelitis following the dramatic drop in the disease in the early forties. Today, as in 1945, it is mainly a disease of childhood. In much of the earlier literature a preponderance of male to female of 5 or 6 to 1 is noted. This is present in Kirker's reviews of 1947 and 1950-51. In 1955 Cullen and Glass in Manchester reviewed 206 cases and here the sex incidence was 2 to 1. However, in 1960 Winters and Cahen reviewed 66 cases in Louisiana and reported an equal sex distribution. The explanation of this trend is not clear. It was generally stated that the increased incidence in boys was due to the fact that they sustained a greater amount of minor traumata than girls and were thus more liable to the disease. But it is rather naïve to suggest that the young girls of 1945 were any less adventurous or less rough than their counterparts of today.

Diagnosis.

From a prognostic point of view early diagnosis in acute hæmatogenous osteomyelitis is of supreme importance. Any delay in instituting the correct treatment is attended by a much greater risk of relapse and a much longer stay in hospital than in those cases in whom treatment is started at once. However,

diagnosis is sometimes difficult and has not been made any easier by the early, inadequate exploitation of antibiotic treatment before the case is seen at hospital. The textbook diagnostic criteria are:—

(1) Acute onset with high fever and obvious toxicity;

(2) severe pain at one site in a limb;

(3) well localised tenderness and occasional swelling over the affected part.

When these are present a diagnosis can usually be made on clinical examination, and, even if the circumscribed pain and tenderness are absent, full antibiotic coverage would normally be given in the presence of the obvious toxicity. This was so in numbers one and three of our cases. Harris describes a series of forty-five cases seen at the Fulham Hospital, London, between 1951 and 1958. A correct diagnosis was made in only twelve of these and seventeen were diagnosed as anterior poliomyelitis, having been admitted to the near-by Western Fever Hospital with this diagnosis. Harris makes the point that it is much better to treat a case of poliomyelitis as an osteomyelitis than vice-versa. Of Winters and Cahen's sixty-six cases seen between 1956 and 1959, twenty-two were admitted with temperatures of under one hundred and no general systemic manifestations. Some of these were under 6 months of age when fever is not a prominent feature of the disease, but the majority of this group had had some form of antibiotic treatment prior to admission to hospital. It is significant that the diagnosis was made more difficult in this group and that the relapse rate and complication rate was much higher than in the series as a whole. A similar picture is seen in numbers two and four of our cases, both of whom had received antibiotic treatment before admission and who had only slight temperatures on admission. In each case the diagnosis on clinical examination was not at all obvious and indeed some time passed before the correct diagnosis was established. During this vital period no antibiotic coverage was given, as there were no general symptoms or toxicity to warrant it. It is my distinct impression that the early antibiotic treatment which these cases received successfully masked the general symptoms of the disease, but was not so successful in annihilating completely, in the affected bones, the bacterial invaders which were protected from the antibiotic by a certain amount of venous and arterial thrombosis and bone necrosis. Consequently the advance of the disease process was merely slowed down but never stopped, and this smouldering infection was able to proceed unhindered. This resulted in large areas of bone destruction and a long delay in healing. The evidence would thus seem to indicate that these cases might have been better off if they had received no antibiotics at all prior to admission. In the early days of penicillin many cases were doubless aborted successfully by one or two injections of penicillin, but this is now no longer the case and early insufficient dosage of antibiotics only serves to confuse the clinical picture. This presents a problem to the general practitioner who first sees the case. He is no doubt tempted to give some antibiotic when he sees a patient with a painful limb and a rising temperature. But osteomyelitis is not a common disease and the average doctor with a practice of two thousand might see one case in five years. Consequently I feel that every

case of suspected osteomyelitis should be admitted to hospital for observation without having received any treatment from his own doctor. The doctor may prefer to observe the case for twenty-four hours to confirm or reject the diagnosis. A twenty-four-hour delay in admission to hospital without antibiotics is preferable to a ten-day delay due to inadequate antibiotic cover.

Treatment.

The correct treatment of osteomyelitis is currently a topic of considerable debate. While formerly it was primarily a surgical problem and even a surgical emergency, the introduction of potent antibacterial agents has profoundly altered this concept and the present role of surgery is now a subject of vigorous argument. The picture is not made any clearer by the emergence of drug resistant organisms. However, the majority of students of the disease are agreed that the most important factor in treatment is antibiotic therapy. Twenty years ago in the golden days of penicillin the treatment of osteomyelitis underwent a revolutionary change. Many authors reported series with 100 per cent. cure rates and no complications; all this in a disease which had previously carried a 10 to 15 per cent. mortality and a 20 per cent. morbidity rate. Prospects were bright indeed when, in 1945, Altemeir and Reinicke wrote: "Penicillin has revolutionised the management of acute hæmatogenous osteomyelitis. The spectacular control of the bacteræmia, the bony infection, and the metabolic visceral complications have produced a radical reduction in morbidity as well as mortality." But as the years passed by this hopeful picture was not maintained. The staphylococcus aureus, responsible for the majority of cases, developed a resistance to penicillin. Twelve per cent. of Cullen and Glass's cases were penicillin resistant while five years later with Winters and Cahen the figure soared to 43 per cent. Harris, at the Royal Orthopædic Hospital in 1962, noted a 35 per cent. resistance rate.

All these authors are unanimous in stating that penicillin is now no longer the drug of choice in osteomyelitis. They maintain that an adequate dose of tetracyclines, 6 grammes in twenty-four hours for adults and a proportionately smaller dose for children, or of penicillin, plus other antibiotic or antibiotics, should be given until an indication of sensitivity is revealed through blood culture or aspiration or drainage of bone. Treatment should be carried on for a minimum of three weeks and often for as long as six weeks.

Koenig and Rogers suggest a combination of aqueous penicillin G and sodium methicillin. The penicillin G should be given in doses of six to ten million units daily and it can be given by continuous intravenous drip through a small scalp vein needle or by four-hourly intramuscular injections. The methicillin should be given intramuscularly, one gramme every four hours to adults or twenty-five milligrammes per kg. of body weight every four hours to children. Vancomycin in a daily dose of two grammes for adults or ten milligrammes per kg. of body weight for infants may be substituted for sodium methicillin or employed in those cases who are allergic to penicillin. Disadvantages are that vancomycin must be given intravenously and it is not without unpleasant side-effects. The rather rare

salmonella osteomyelitis, so often associated with sicklemia, should be treated with full doses of chloramphenicol given orally, intramuscularly or intravenously.

It is interesting to note that these views are at variance with the modern therapy of bacterial endocarditis which physicians now only academically divide into acute and subacute forms. In an important paper by Vogler, Dorney, and Bridges, which was later made the substance of a leading article in the *Lancet* (1962) the drug of choice in this disease is penicillin, and penicillin only, in massive dosage. Moreover, the organism responsible for the majority of cases of endocarditis is no longer the streptococcus viridans but the staphylococcus aureus. Osteomyelitis and endocarditis thus both start as an acute staphylococcal bacteræmia; the one proceeding to affect bone and the other the heart. Vogler's recommended daily dose of penicillin is six million units, but it may be increased to fifty million if the organism is pencillin resistant. In some unknown way swamping the organism with penicillin seems to overcome its resistance to the drug.

In the four cases of osteomyelitis described the drug used was one of the tetracyclines.

The other two aspects of treatment are immobilization and surgery.

Immobilization of the affected part, preferably by a plaster cast, gives support to the extremity and seems to prevent deformity. It also reduces the rate of dissemination of organisms along venous and lymphatic routes. Winters and Cahen lay great stress on the importance of immobilization and deplore its widespread neglect. They maintain that certain complications are more apt to occur without it. These include bone and joint deformity, pathological fracture, and dislocation of a septic joint.

There is at present no general agreement about the role of surgery and when it should be performed. A wide variety of views has been expressed in recent papers. Generally speaking, if pain and tenderness have not altered in forty-eight to seventy-two hours and if there has been no reduction in fever in spite of antibiotics, drainage should be carried out forthwith.

In the case of drainage of a chronic abscess or sequestrectomy the timing of the operation is not so important.

Summary.

Four unusual cases of osteomyelitis are described. They all presented diagnostic problems and were only diagnosed after varying lengths of time. Two cases had an acute onset and two had an insidious onset, the latter two having received antibiotic treatment before admission.

The incidence of the disease is on the increase and the sex ratio, male to female, is today one to one.

The diagnosis of the disease is sometimes difficult and it is being made more difficult by the inadequate use of antibiotics prior to hospitalization. This is illustrated in two of the described cases.

The disease is best treated in hospital and general practitioners should admit suspected cases for observation. Treatment outside hospital is to be deplored.

Adequate antibiotic cover is the most important factor in treatment. There are many views on the choice of antibiotic.

Immobilization and surgery are essential adjuncts in therapy and the timing of the latter in the acute case is important.

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REVIEW

A HUMAN APPROACH TO GENERAL PRACTICE. By C. P. Elliott-Binns, M.B., B.Ch., D.C.H., D.Obst.R.C.O.G. (Pp. vii + 76. 7s. 6d.) Edinburgh and London: E. & S Livingstone Ltd., 1963.

The transition from academic and hospital life to general practice is effected with ease by some doctors and with varying degrees of difficulty by others. Perhaps the path is most difficult for those who have aimed at consultant or specialist practice and have failed to attain.

This little book has been written to help the entrant to general practice to come to terms with his new way of life. The older doctor who has achieved his own philosophy knows already what is written here and can confirm its truth from personal experience.

The author discusses such matters as the reconciliation of the conflicting interests in the doctor's life, his personal, family and social claims *versus* his duties towards his patients. He deals also with the organization of the practice, its delights and its frustrations, pitfalls in diagnosis and the maintenance of clinical standards.

When all these matters have been assessed, there remains still the paramount consideration of the doctor's philosophy. In the final summation this is based on the Christian ethic and the precepts of Hippocrates. "For where there is love of man, there is also love of the art." W. G. F.